GROUND STAKE WITH SHORT VANE

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

[0001] This disclosure relates to ground stakes, such as tent stakes for securing tents to the ground. The ground stakes have one or more short vanes shaped to resist pulling from the soil.

Description of the Related Art

[0002] Ground stakes per se are well known in the art and typically have a shaft having a penetration end that is driven into the ground and an attachment portion for attaching whatever object (e.g., a tent or rope) is desired to be anchored to the ground.

[0003] Most ground stakes are driven directly into the ground like a nail, but there are also those designed to be screwed into the ground, such as is described in *Bennet et al.*, US 4,543,972, for a LOCKABLE TENT STAKE, issued October 1, 1985, among others. These generally suffer the drawback of requiring a source of simultaneous torque and downward driving force. They are also expensive to produce as the shaft of the stake must either be threaded or coiled. In coiled versions, such as disclosed by *Bennet*, the coil is susceptible to distortion and damage in hard soil conditions.

[0004] As for those tent stakes designed to be driven straight into the ground, many have long vanes, that is to say that the shaft of the stake has a plurality of vanes depending therefrom and extending substantially along the entire length of the shaft, such as is disclosed in *Adams*, US Des. 377,076 for a TENT STAKE, issued December 31, 1996 and a host of other utility and design patents. The difficulty with such long vane ground stakes is that they are costly to manufacture and difficult to drive into the ground. The difficulty in driving a long vane stake

into the ground arises from the need to displace soil along the entire length of the shaft while driving the stake into the ground.

[0005] Much more economical are wire stakes, such as described in *Vandiver*, US 4,905,719, for a TENT STAKE, issued March 6, 1990. A problem with wire stakes is that they are more easily pulled from the soil than many other types of ground stakes. Nevertheless, there is no cheaper stake to manufacture, as fabrication requires merely the bending and perhaps some minor welding, of a length of cheap wire stock.

BRIEF SUMMARY OF THE DISCLOSURE

[0006] Disclosed is a ground stake comprising a shaft defining a shaft axis, the shaft further comprising a penetration end shaped to facilitate forcing of the the shaft into soil and a driving end for driving the shaft into soil;

[0007] an attachment portion adapted to securely fasten an object to the stake;

[0008] a short vane depending outward from the shaft axis, the short vane defining a backfill space between the short vane and the shaft axis; and

[0009] wherein the short vane is effective in substantially resisting the removal of the shaft from soil into which it has been driven.

[0010] In another aspect of the apparatus the short vane is shaped so as to provide less resistance to driving the shaft into soil than the resistance to the removal of the shaft from soil.

[0011] In another aspect of the apparatus the short vane lies a plane parallel to the shaft axis.

[0012] In another aspect of the apparatus the short vane lies in the same plane as the shaft axis.

[0013] In another aspect of the apparatus the short vane comprises an insertion leading edge and an extraction leading edge.

[0014] In another aspect of the apparatus the insertion leading edge defines an insertion angle of attack, the extraction leading edge defines an extraction angle of attack, and the insertion angle of attack is less than the extraction angle of attack.

[0015] In another aspect of the apparatus the shaft comprises a wire rod.

[0016] In another aspect of the apparatus the short vane comprises a shaped wire rod.

[0017] In another aspect of the apparatus the shaft and the short vane are made from a single shaped wire rod.

[0018] Another aspect of the apparatus further comprises at least one long vane having a short vane portion.

[0019] Disclosed is a ground stake comprising a shaft defining a shaft axis, the shaft further comprising a penetration end shaped to facilitate forcing of the shaft into soil and a driving end for driving the shaft into soil, an attachment portion adapted to securely fasten an object to the stake, a short vane depending outward from the shaft axis, wherein the short vane comprises an insertion leading edge and an extraction leading edge and wherein the insertion leading edge defines an insertion angle of attack, the extraction leading edge defines an extraction angle of attack, and wherein the insertion angle of attack is less than the extraction angle of attack, and wherein the short vane is effective in substantially resisting the removal of the shaft from soil into which it has been driven.

[0020] In another aspect of the apparatus, the short vane is made from sheet metal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Figures 1a and 1b show a front and side view of a short vane embodiment of the disclosure.

[0022] Figures 2a and 2b show wire vane backfill embodiments of the disclosure.

[0023] Figure 3 shows a barbed backfill embodiment of the disclosure.

[0024] Figure 4 shows a deviated shaft backfill embodiment of the disclosure.

[0025] Figures 5a and 5b show vaned backfill embodiments of the disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Referring to Figure 1a there is shown a side view of a short vane embodiment of the ground stake 1 of the disclosure. The ground stake 1 has a shaft, a penetration end 3 for penetrating soil during insertion, a driving end 4 for driving the stake into the ground by hand or with a tool (e.g., a hammer), and an attachment portion 5 for attaching an object to the stake. Generally a tent or other object will be attached via a tent loop, rope, or guy wire. If desired, the attachment portion may be adapted to attach an object directly. For example, the attachment portion may be in the form of a hose clamp for the purpose of anchoring hoses or pipes. For simplicity, the attachment portion 5 in the drawings will be shown as a simple hook.

[0027] Note that the penetration end 3 may be a pointed penetration end 3' as in Figure 1a or a simple flat penetration end 3 as in Figure 1b, depending on the thickness of the shaft 2. For narrow gauge wire (e.g., 1/8 to ¼ inch) for use in small loads, such as tents, the wire shaft 2 will generally be narrow enough to not require sharpening of the penetration end 3. For wire stakes larger than ¼ inch, it may be desirable to sharpen the penetration end 3' as shown in Figure 1a. From a functionality standpoint, it is always desirable to sharpen the penetration end 3', but there are also cost considerations and it will generally be found that sharpening is not very cost effective for shaft diameters at or below ¼ inch.

[0028] Also provided is a vane in the form of a short vane 6 having an insertion leading edge 7 and an extraction leading edge 8. The insertion leading edge 7 is so called because it is the leading edge of the vane 6 when the stake is driven into the ground, while the extraction leading

edge is the leading edge 8 of the vane when the stake is being pulled from the ground. Each leading edge defines an angle of attack to the soil through which it is being driven. Preferable, the insertion angle of attack ***i*** will be less than the extraction angle of attack ***e***, thereby making it easier to insert the stake in the ground than to pull it out.

[0029] Note that, unlike a long vane, the short vane runs only a fractional length of the shaft, such that the extraction leading edge is submerged into the soil. For this reason, long vanes have no extraction leading edge. It is also desirable that the short vane 6 runs along no more than about two-thirds or less, preferably one half or less, of the length of the shaft and that it be disposed nearer the penetration end 3 than the driving end 4. Preferably, the short vane 6 will be disposed in the lower half of the length of the shaft 2, such that the insertion leading edge 7 is closer to the penetration end 3 than the length of the short vane 6 itself. A typical ground stake 1 for use with small and medium size recreational tents might be made of about 3/16 diameter metal wire rod, unsharpened, with a total stake length of about 7 to 8 inches, a shaft length of about 6 to 7 inches, and a short vane about 2 inches long starting 1 inch from the penetration end and extending ½ to 1 inch out from the shaft 2. The vane will typically be a piece of sheet metal and may be substantially the same width as the shaft or slightly wider or thinner as desired. Alternatively, the stakes may be formed of a strong plastic.

[0030] Of course, the drawing shows only one short vane 6, but additional vanes may be added if desired, such as for heavier loads. For simple loads, such as small or medium size tents, tarps, and the like, one short vane will generally be found to be sufficient and most cost effective.

[0031] Referring to Figures 2a and 2b there is shown a backfill wire short vane 6 embodiment of the ground stake 1 of the disclosure. Here, the wire short vane 6 defines a backfill space 10 between the short vane and the wire rod shaft 2 into which soil may backfill when the ground stake 1 is being driven into the ground. This is a preferred improvement over the embodiment of Figure 1 not only because the backfill further increases the resistance of the stake 1 to being pulled from the ground, but also because it is much easier, faster, and cheaper to manufacture. Note how another length of wire may simply be shaped and welded onto the shaft at spot weld points 11 as shown in Figure 2a. The backfill wire short vane may be made of the same gauge

wire so as to simplify the logistics of manufacture. An even more efficient embodiment is shown in Figure 2b wherein a single length of wire is bent around and spot welded back to the shaft 2 at a single spot weld point 11, thereby forming a rounded penetration end 3". Additional wire short vanes may be added by spot welding shaped wire segments such as that shown in Figure 2a.

[0032] Referring to Figure 3, there is shown a half-protuberant, or "barbed" embodiment of the backfill embodiment of the disclosure wherein the wire short vane 6 fails to complete a loop. The result is that the extraction leading edge 8 and the insertion leading edge 7 are on opposite sides of the same wire segment and have equal angles of attack. Here, it is not a differential in angle of attack, but rather the resistance afforded by the backfill space 10 that causes the stake 1 to be more difficult to pull out of the ground than to drive in. This is cheaper and easier to manufacture than the previous embodiments, but provides lesser anchoring and is suitable for lighter loads. More barbs may be provided by spot welding shaped wire segments to the shaft 2.

[0033] Referring to Figure 4, for the lightest loads, there is shown a deviated shaft backfill wire short vane 6 embodiment of the disclosure wherein the shaft 2 is shaped and deviated from it's straight configuration so as to form the backfill space 10 and the extraction 8 and insertion 7 leading edges. This embodiment shares the cost advantages of using a single wire without spot welds just as the embodiment of Figure 3 does, but provides the differing angles of attack for the leading edges that the embodiment of Figure 3 lacks. Unfortunately, the backfill space is not as effective as that of the embodiment of Figure 3 because the backfill space is not between the short vane and the shaft, but merely between the short vane and the shaft axis, thereby losing much of the soil compression that would have otherwise been attained during extraction, so this version is for the lightest loads. Nevertheless the embodiment of Figure 4 has the advantage of being the cheapest to manufacture because the deviation may be imparted to the wire in a continuous rolling process.

[0034] Referring to Figures 5a and 5b, there are shown vaned backfill embodiments of the disclosure. In Figure 5a, one or more short vanes 6 are provided that define backfill spaces 10,

hence this is a backfill embodiment of the short vane embodiment described with respect to Figure 1.

[0035] In Figure 5b, a ground stake having one or more long vanes 12 is modified so that one or more of the long vanes defines a backfill aperture 10. Preferably, the long vane may be modified to define an extraction leading edge 8 as well by expanding the long vane outward near the penetration end 3 so as to form a short vane segment 15. This modification to a long vane version of a ground stake alleviates a major problem with long vane stakes, namely that they are difficult to drive into the ground because the soil must be displaced along the entire length of each long vane. By providing a short vane segment with a backfill aperture, the backfill relieves some of the soil pressure. Further, the expanded short vane segment 15 permits the long vane portion 12 to be narrower than in a comparable ground stake.

[0036] While various values, scalar and otherwise, may be disclosed herein, it is to be understood that these are not exact values, but rather to be interpreted as "about" such values, unless explicitly stated otherwise. Further, the use of a modifier such as "about" or "approximately" in this specification with respect to any value is not to imply that the absence of such a modifier with respect to another value indicated the latter to be exact.

[0037] Changes and modifications can be made by those skilled in the art to the embodiments as disclosed herein and such examples, illustrations, and theories are for explanatory purposes and are not intended to limit the scope of the claims. Further, the abstract of this disclosure is provided for the sole purpose of complying with the rules requiring an abstract so as to allow a searcher or other reader to quickly ascertain the subject matter of the disclosures contained herein and is submitted with the express understanding that it will not be used to interpret or to limit the scope or the meaning of the claims.